# VEHICLE COMMUNICATION SYSTEM

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a communication system and, more particularly, to a vehicle communication system.

2. Description of Related Art

FIG. 1 illustrates he voice signal transmitting and receiving operation of a conventional GSM module **31**. Voice signal is transmitted and received through the GSM module **31**. FIG. 2 illustrates the data signal transmitting and receiving operation of a conventional GSM module **32**. Data signal is transmitted and received through the GSM module **32**. A conventional GSM module **31** can be used to transmit or receive voice signal as well as data signal, however it cannot transmit or receive voice signal and data signal at the same time, i.e., when transmitting or receiving data signal, the GSM module **31** is prohibited from transmitting or receiving voice signal; when transmitting or receiving voice signal, the GSM module **31** is prohibited from transmitting or receiving data signal. When wishing to transmit voice signal and data signal, two separate phone calls are needed to achieve transmission of voice signal and data signal separately.

Therefore, it is desirable to provide a vehicle communication system that eliminates the aforesaid drawbacks.

## SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. It is therefore the main object of the present

invention to provide a vehicle communication system, which adds data to voice and then transmits the data-carrying voice signal thus obtained to a remote side by a GSM module and, which demodulates data-carrying voice signal received by the GSM module from a remote side into packet data and voice for output separately.

To achieve these and other objects of the present invention, the vehicle communication system comprises a voice pick-up device adapted for picking up external voice signal; a carrier wave modulator circuit adapted for modulating a data into an analog signal and adding the modulated analog signal to the voice signal provided by the voice pick-up device, forming a data-carrying voice signal; a GSM (Global System for Mobile) module adapted for transmitting the data-carrying voice signal provided by the carrier wave modulator circuit to a remote side wirelessly, and receiving an another data-carrying voice signal from a remote side; a voice output device; and a demodulator circuit adapted for demodulating the another data-carrying voice signal received by the GSM module, and discriminating the signal into a voice signal for enabling the voice signal to be outputted through the voice output device, and a data.

Other objects, advantages, and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic drawing showing the voice signal transmitting and receiving operation of a GSM module according to the

prior art.

FIG. 2 is a schematic drawing showing the data signal transmitting and receiving operation of a GSM module according to the prior art.

FIG. 3 is a system block diagram of a vehicle communication system according to the present invention.

FIG. 4 is a flow chart illustrating the data-carrying voice signal transmitting action of the vehicle communication system according to the present invention.

FIG. 5 is a flow chart illustrating the data-carrying voice signal receiving action of the vehicle communication system according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A vehicle communication in accordance with the present invention, as shown in the functional block diagram of FIG. 3, comprises a voice pick-up device **2**, a carrier wave modulator circuit **11**, a demodulator circuit **12**, a voice output device **6**, a GSM module **3**, a packet assembler/disassembler unit **4**, and vehicle supplementary systems **5**. The carrier wave modulator circuit **11** and the demodulator circuit **12** may be combined, forming a carrier wave modulator/demodulator module **1**. Further, a data bus **50** is provided between the packet assembler/disassembler unit **4** and the vehicle supplementary systems **5** for data transmission.

The voice pick-up device **2** can be a microphone adapted for picking up external voice signal. Output and input of every vehicle

supplementary system **5** are of data type. The vehicle supplementary systems **5** include, for example, GPS (Global Positioning System) system **51**, auto-navigation system **52**, burglar alarm system **53**, or PDA (Personal Digital Assistant) system **54**, ... etc. Every vehicle supplementary system **5** can be separately operated, and several vehicle supplementary systems **5** can simultaneously be used. All the vehicle supplementary systems **5** can respectively transmit data to the packet assembler/disassembler unit **4** through the data bus **50**. The packet assembler/disassembler unit **4** assembles or disassembles received data. The carrier wave modulator circuit **11** receives assembled packet data from the packet assembler/disassembler unit **4** and voice signal from the voice pick-up device **2**, modulates the data into an analog signal, and adds the analog signal to the voice signal, forming a data-carrying voice signal. The GSM module **3** sends the data-carrying voice signal from the carrier wave modulator circuit **11** to the remote side wirelessly, and receives another data-carrying voice signal from the remote side. The demodulator circuit **12** demodulates the data-carrying voice signal received by the GSM module **3**, enabling data to be separated from the voice signal, and then directly transfers the data to the packet assembler/disassembler unit **4** for disassembling. The packet assembler/disassembler unit **4** disassembles the data outputted from the demodulator circuit **12**, and then sends the disassembled data to the vehicle supplementary systems **5** through the data bus **50**. The voice output device **6** can be, for example, a speaker adapted for output of demodulated voice signal.

FIG. 4 is a block diagram illustrating the data-carrying voice signal transmitting action of the vehicle communication system. When wishing to transmit data and voice signal to the remote side and the data to be transmitted including data from the PDA system **54** and data from the auto-navigation system **52**, the data from the PDA system **54** and the data from the auto-navigation system **52** are transferred to the packet assembler/disassembler unit **4** through the data bus **50**, and then the packet assembler/disassembler unit **4** assembles the received two data into a packet data (Step 301) and transfers the packet data to the carrier wave modulator circuit **11** of the carrier wave modulator/demodulator module **1**. The carrier wave modulator circuit **11** of the carrier wave modulator/demodulator module **1** immediately modulates the packet data into an analog signal, and then adds the analog signal to the voice signal received from the voice pick-up device **2**, forming a data-carrying voice signal (Step 302), which is then transmitted to the remote side through the GSM module **3** (Step 303).

FIG. 5 is a block diagram illustrating the data-carrying voice signal receiving action of the vehicle communication system. Upon receipt of a data-carrying voice signal from a remote side by the GSM module **3** (Step 304), the GSM module **3** immediately transfers the data-carrying voice signal to the demodulator circuit **12** of the carrier wave modulator/demodulator module **1** where the data-carrying voice signal to the demodulator circuit **12** demodulates the data-carrying voice signal into packet data and voice signal (Step 305). The voice signal thus discriminated is then outputted through the voice output device **6** (Step

306), and the packet data thus discriminated is then transferred to the packet assembler/disassembler unit **4** where the packet assembler/disassembler unit **4** disassembles the packet data and classifies the disassembled data subject to its column value or particular bit (Step 307), enabling the auto-navigation system **52** to obtain navigation information, the PDA system **54** to obtain stock market information.

As indicated above, the invention uses a packet assembler/disassembler unit to assemble different vehicle supplementary system data into respective packet data or disassemble demodulated packet data into corresponding vehicle supplementary system data, a GSM module to transmit/receive data-carrying voice signal, a carrier wave modulator circuit to modulate packet data into analog signal and to add the modulated analog signal to a voice signal to form a data-carrying voice signal for transmitting to a remote side through the GSM module, and a demodulator circuit to demodulate data-carrying voice signal and discriminate the signal into packet data and voice signal.

Although the present invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.